DOCUMENT RESUME

ED 079 183 SO 005 855

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TITLE Cross-Cultural and Longitudinal Comparisons of Cognitive, Perceptual and Personality Measures in Mexico and the United States.
PUB DATE 25 Feb 73
NOTE 14p.; Paper presented at the American Educational Research Association Meeting (New Orleans, Louisiana, February 25-March 1, 1973)

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Child Development; *Comparative Analysis; *Cross Cultural Studies; Cultural Background; Cultural Differences; Cultural Education; *Cultural Factors; Culture Free Tests; Educational Research; Family Influence; *Individual Development; Latin American Culture; Mexicans; *Personality Development; Spanish Culture; Speeches
IDENTIFIERS American Educational Research Association; *Mexico

ABSTRACT

Insight can be gained into the role of specified cultural variables in human development if care is taken in a study to include subcultural variations which can be matched cross-bulturally, to employ well-trained native examiners who have been calibrated cross-culturally, to use techniques which can be defended, and to involve the close and continual collaboration of investigators sensitive to the above issues. This paper reports findings from six years of repeated testing of children from Texas and Mexico, who were selected to represent a broad range of working-class, business, and professional families. A complex analysis-of-variance design was constructed with five main factors: 1) socioeconomic status; 2) sex; 3) age group when tested initially; and 5) year of repeated testing or trial. The main effects for culture proved highly significant, revealing important differences in developmental trends for the entire age span of 6-17 years in Mexican and American children. This study reports only highlights of a much larger research program involving hundreds of children and their families. Additional studies are aimed at gaining greater insight into the complex relationships between cognitive, perceptual and personality measures on the one hand and family life-style, home environment and school performance variables as these aspects of personality development change over time in the two cultures. (JMB)

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ED 079183

CROSS-CULTURAL AND LONGITUDINAL COMPARISONS OF COGNITIVE, PERCEPTUAL AND PERSONALITY MEASURES IN MEXICO AND THE UNITED STATES [1]

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Little is known about the interaction of culture and personality development over time, largely because of the expense and difficulty of undertaking longitudinal research in two or more cultures simultaneously (Holtzman, 1965, 1968). Where repeated psychological testing in a longitudinal design is employed, the effects of practice and selective attrition can seriously distort the results. Where individuals within two or more cultures are examined using the same techniques, the meaning of a given test may differ, partly because of problems in language translation, partly because the examiner-subject interaction may be different, and partly because the experiential background of subjects in two cultures may be very different. In addition to special issues peculiar to cross-cultural and longitudinal designs, there are the usual

[1] Paper presented at symposium on "International and intercultural similarities and differences in behavior traits." Annual Meeting of the American Educational Research Association, New Orleans, Louisiana, February 25-March 1, 1973.

[2] The author wishes to thank his research associates in Austin and Mexico City, especially Jon Swartz, Donald Witzke, and Luis Laosa who helped analyze the test data reported herein. This study is only one small part of a major program of research under the direction of Rogelio-Diaz Guerrero and the author, supported by research grant M-3223 from the U.S. Public Health Service and by research grant 63-282 from the Foundations Fund for Research in Psychiatry.

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difficulties in determining whether or not significant aspects of personality are being measured.

Granted that generalizations must be limited and tentative, pending further replications, and that rigorous cross-cultural designs can only be approximated at best, the situation is not quite as discouraging as may appear at first glance. Even in a bicultural study a great deal of insight can be gained into the role of specified cultural variables in human development, provided care is taken to include subcultural variations which can be matched cross-culturally, to employ well-trained native examiners who have been calibrated cross-culturally, to use only techniques which can be reasonably defended in both cultures, and, most important of all, to involve the close and continual collaboration of seasoned, native investigators who are fully sensitive to the above issues in both cultures. The remainder of this paper describes such a research program in Mexico and the United States and reports some of its findings from six years of repeated testing.

A major part of the impetus for a longitudinal study of cognitive, perceptual, and personality development in children came from successful completion of the basic standardization program for the Holtzman Inkblot Technique ten years ago (Holtzman, Thorpe, Swartz, and Herron, 1961). Within normal populations ranging from five-year olds to superior adults, age trends were found for all but two of the 22 individual scores analyzed (Thorpe and Swartz, 1965). These results indicated a shift from the impulsive production of diffuse, undifferentiated responses, uncritical of form, to increasingly mature, well organized perceptual and ideational activity.

At the same time, periodic exchanges and seminars were held devoted to culture and personality which involved Mexican psychologists led by Rogelio Diaz-Guerrero and American psychologists in our research group at The University of Texas. An unusual degree of long-term collaboration and commitment to cross-cultural studies developed, providing a firm basis for a longitudinal study of school children in both cultures.

Defining the Samples

An overlapping longitudinal design was employed so that a span of twelve years could be covered in only six years of repeated testing. The basic design is presented in Table 1. The three years of overlap for each of the three groups of children make it possible to correct developmental trends for practice effects, yielding one continuous curve over the ages six to seventeen for each variable studied in each culture. Initial ages for testing were set at 6 years, 8 months, for the youngest group; at 9 years, 8 months, for the middle group; and at 12 years, 8 months, for the oldest group of children. These particular ages were selected so that all testing could be done during the school year.

In Austin, children were mainly drawn from six elementary schools and one junior high school, representing a broad range of working-class, business, and professional families. Defining the sample and selecting children in Mexico City proved to be more difficult. Preliminary pilot studies and demographic surveys had to be undertaken before a detailed sampling plan could be formulated. Consequently, there is a three-year lag in the collection of test data; the Austin project was in the middle of its third year of repeated testing when the first year of testing was begun in Mexico. Three school systems in Mexico City eventually

Table 1

Overlapping Longitudinal Design for Six Years of Repeated Testing in Austin and Mexico City

Group	Initial Age*	Number of Cases Austin	Mexico	School Grades Covered
I	6.7	133	151	1 2 3 4 5 6
II	9.7	142	140	4 5 6 7 8 9
III	12.7	142	152	7 8 9 10 11 12
Total		417	443	

*The starting ages of 6.7, 9.7, and 12.7 years were chosen since most children in the public schools of Texas reach these exact ages at some time during the school year, September 15 - May 15. Actual time of testing took place within 30 days of the age as specified in the table.

were employed, two public and one private. By drawing more heavily upon the private school system where families were very similar in socio-economic status to most of the American families in Austin, it was estimated that nearly two-thirds of the Mexican and Austin Children could then be used for cross-cultural comparisons in which important subcultural variations would be matched across the two samples.

Tests and Related Measures

While some tests used in Mexico were not employed in the United States and vice versa, a large core of identical ones were used in both cultures. In addition to the Holtzman Inkblot Technique, the basic test battery consisted of selected subtests of the Wechsler Intelligence Scale for Children, the Human Figure Drawing, Sarason's Test Anxiety Scale for Children, measures of time estimation, an object sorting test, the Embedded Figures Test, and a variety of other personality, perceptual and cognitive tests. Family and home ratings from interviews with mothers and parental attitude scales were also employed midstream in the longitudinal program. Peer group sociometric ratings and data from the schools completed the material collected, as outlined in Table 2.

Matched Samples and Analysis of Variance Design

Earlier studies on the first two years of data collection (Holtzman, Diaz-Guerrero, Swartz, and Lara-Tapia, 1968) indicated that socioeconomic status of the family could be effectively measured by a weighted combination of father's occupational level and father's education. Occupational level was rated in steps ranging from 2 for unskilled manual laborers to 9 for large business owners and executives, and education was rated in

Table 2

Psychological Test Batteries and Related Measures Common to Both Longitudinal Studies

Core Test Battery (All Ss for 6 years)

Holtzman Inkblot Technique (22 scores)
Human Figure Drawing
Vocabulary (WISC or WAIS)
Block Design (WISC or WAIS)

Supplementary Repeated

Test Anxiety Scale for Children (1 or 3 scores)
Time Estimation (3 scores)
Filled Time Estimation (Texas Ss 4th, 5th, and 6th years)
Test Behavior Ratings (5 scores)
Object Sorting Test (first 3 years, 7 scores)
Embedded Figures Test (all Ss age 9.7 or older, 4 scores)
Stroop Color-Word Test (Texas Ss age 9.7 or older for 4 years, 2 scores)
Visual Fractionation Test (all Ss for 2 years, 6 scores)
Conceptual Styles Test (ages 7.7 and 8.7 only, 6 scores)
Perceptual Maturity Scale (last 3 years, 1 score)
Word Association Test (last 3 years, 7 scores)
WISC or WAIS Arithmetic and Picture Completion (all Ss, 1st, 5th, and 6th years)

Other Measures

WISC Remaining Subtests (age 6.7)
Family and Home Ratings from Interviews with mothers
Parental Attitude Scales (mother)
Academic Summary (School record data)
Occupational Values Inventory (all Ss, 6th year)
Personality Research Form (all Ss, 6th year)
Survey of Study Habits and Attitudes (Texas Ss age 17.7, Mexico Ss 4th and 5th years)
Manuel's Reading Test (Mexico Ss 4th and 5th years)
Views of Life and Sociocultural Premises (Mexico selected Ss 6th year)

steps ranging from 1 for no formal schooling to 9 for advanced or professional degree. Combining the ratings for each individual, with a weight of 3 assigned father's education and a weight of 2 given father's occupation, yielded an index of socioeconomic status ranging from 5 to 45. A score of 28 or above was selected as representing middle class. A score of 27 and below was chosen to designate a lower class.

Each Mexican child was paired with an American child on sex, age-grade, and socioeconomic status of the family until all the closely matched cases were exhausted. This procedure yielded 196 precisely matched pairs, 56 in the youngest group, 75 in the middle group, and 65 in the oldest group -- a total of 392 individuals for whom complete parental interview data and repeated test scores on most of the instruments were available for the six years of the study. Occasionally, missing data were encountered on some of the measures because a child could not be tested in a particular year. Predicted scores for the missing year were obtained by a linear estimate using all available scores of the individual across the six years, and the mean square error terms and degrees of freedom were adjusted for the missing observations.

A complex analysis-of-variance design was constructed with five main factors: (1) socioeconomic status, high or low; (2) sex, male or female; (3) age-group when tested initially, Groups I, II, and III; (4) culture, Mexican or American; and (5) year of repeated testing or trial, 1 through 6. With six years of repeated test data for both Mexican and American children matched in 196 pairs, a total of 2352 scores were

available for selected subtests of the WISC and for each of the 17 inkblot variables studied. For most other measures only partial longitudinal data are available, as indicated in Table 2 where all measures are outlined. Time permits presentation of only a few results to illustrate both longitudinal and cross-sectional analyses and their significance.

Results

The main effects for culture proved highly significant ($p < .001$) for all but five of the 17 inkblot variables studied -- Rejection, Form Definiteness, Form Appropriateness, Human, and Animal. In general American children obtained higher scores on Color, Shading, Movement, Pathognomic Verbalization, Integration, Anxiety, Hostility, Barrier, and Penetration. Mexican children got higher scores on Reaction Time, Location, and Anatomy. Of much greater interest than the gross main effect of culture, however, are the interactions of culture with socio-economic status, sex, age, and year of repeated testing.

Six of the inkblot variables showed significant interactions among culture, age-group, and year of testing, revealing important differences in developmental trends for the entire age span of 6-17 years in Mexican and American children. The three years of overlap between Groups I and II and between Groups II and III provided double the number of age-linked test scores for ages 9-14. The means for these overlap years are based on both groups to simplify the presentation and partially correct for minor practice effects due to repeated testing. Mean Reaction Time slowly increased with age, more so for Mexican than American children ($F = 3.20$, 10/798 d.f., $p < .001$). Mexicans generally took longer before

giving a response to an inkblot, except for the oldest children as seen by the two growth curves converging at age 17.

Among the young children, the Mexicans tended to report percepts that fitted the actual form of the inkblot more often than did the Americans ($F = 4.90$, 10/798 d.f., $p < .001$). This difference favoring the Mexicans disappeared by the age of 12, reappearing again in later adolescence.

The youngest American children gave significantly more responses with shading as a determinant than did their Mexican counterparts. With increasing age this gap narrowed gradually until it disappeared in adolescence. From the age of 12 on, no differences in mean Shading score were discernible between the two cultures.

A significant interaction of culture by socioeconomic status was also obtained for Shading ($F = 9.44$, 1/184 d.f., $p < .01$). The American lower-class children gave the greatest amount of Shading while the Mexican lower-class gave the least. The overall difference between upper-class Mexicans and Americans was not significant.

The American children generally gave more inkblot responses containing pathognomic verbalization than did the Mexican children. This difference was particularly striking among the younger children where, except for 7-year-olds, V scores for the Americans averaged two to three times the amount of V for the Mexicans ($F = 3.83$, 10/798 d.f., $p < .001$).

Among the younger children, the Mexicans tended to give more animal responses to inkblots and fewer human responses than did the Americans. From the age of nine on, the mean scores on Human are almost identical in both cultures. Mean scores on Animal tend to converge by age 13.

The cross-cultural developmental trends for Hostility are complex, as evidenced by a significant four-way interaction involving sex as well as age-group, year of repeated testing, and culture ($F = 4.43$, 10/540 d.f., $p < .001$). The very youngest American boys gave considerably more responses with hostile content than did the Mexican boys, nearly four times as much on the average for six-year-olds. This gap narrowed somewhat in later years when all three groups are considered, although American boys got higher Hostility scores at nearly every age. For the girls, the six-year-olds in both cultures were low in Hostility. The Mexican girls remained low, not differing appreciably from Mexican boys at any age. The American girls increased in Hostility with increasing age, but always remained below the American boys with whom they were matched.

American children were more responsive to color in the inkblots than were Mexican children. This difference was particularly marked among children from the working-class families where Americans obtained a mean score (14.9) more than twice that of the Mexicans (6.8). Among children from upper-middle-class families the mean Color score for Americans (12.5) was only slightly higher than the mean for Mexicans (10.1), yielding a significant interaction between socioeconomic level and culture ($F = 9.52$, 1/184 d.f., $p < .01$).

Scores from the first administration of a test are of special interest in cross-cultural comparisons since there is no possibility of adaptation or practice due to repeated testing. Some representative results with tests other than the Holtzman Inkblot Technique serve to illustrate the general findings. The same matched cross-cultural samples

as in the longitudinal analyses were employed in analyses of variance involving culture, sex, age-group, and socio-economic status of the family.

The most direct measures of mental abilities come from the WISC. All four of the main effects in the analysis of variance for WISC: Arithmetic are significant beyond the .01 level, especially age-group and culture. Children from families of relatively high SES level tended to do better than those from lower-class families. The American children obtained higher scores on arithmetic than the Mexican; and boys tended to do better than girls. A highly significant interaction between age-group and culture resulted from the fact that the Mexican children did better than the Americans on arithmetic in the first grade but this advantage is soon lost. By the 4th grade, the American children surged ahead of the Mexicans, continuing to widen the gap in the 7th grade. This interaction suggests that something is happening in the American schools to bring about a more rapid development of arithmetic ability than is taking place in the Mexican schools.

The interaction between culture and social class for arithmetic is also of interest. While no significant difference exists between the upper- and lower-class families of American children, a marked difference is apparent in the Mexican families, the upper-class Mexican children doing better than those from working-class families.

The Vocabulary subtest also revealed highly significant main effects, as well as a significant four-way interaction of a complex nature. Among the Americans, sex and social class differences in Vocabulary were negligible. The only primary variable of any importance is the age of

the child. Essentially the same picture is evident for both upper- and lower-class Mexican boys. For the Mexican girls, however, the pattern is distinctly different. Upper-class Mexican girls start out in the 1st grade only slightly ahead of lower-class girls but the gulf between them widens appreciably with increasing age. The lower-class Mexican girl is placed at a distinct disadvantage as contrasted to upper-class Mexican girls or Mexican boys of either social class. These differential results suggest a sex-linked difference between the environment of boys and girls in Mexico and the environment in the United States.

Quite a different measure is represented by Sarason's Test Anxiety Scale for Children. Socio-economic status, culture and sex proved to be highly significant main effects, although no higher order interactions approached significance. The most striking difference appeared in the comparison of Mexican and American children, the Mexicans receiving much higher scores than the Americans. Since scores on the Lie Scale and the Defensiveness Scale did not differ appreciably in the two cultures, these results strongly suggest that children in Mexico are considerably more anxious about taking tests in school than are their counterparts in the United States.

Time does not permit a review of the many other significant findings in this cross-cultural longitudinal study. The interactions between culture, socio-economic status, age and sex are especially interesting. These results are easier to interpret when viewed in the light of the different pattern of values and beliefs implicit in the two cultures.

Americans tend to be more active than Mexicans in coping with the stresses of life. Most Mexicans, particularly women, believe that life is to be endured rather than enjoyed, that it is better to be safe than sorry, and that it is better to proceed slowly than fast. In general, when faced with a testing situation, the Mexican child is willing to cooperate although he seldom takes the initiative. He will try to please the adult examiner and will tend to be cautious. By contrast, the American child will see the testing situation as a challenge to be mastered, an opportunity to show how much he can do.

These different coping styles are clearly evident in the marked cross-cultural differences obtained on most variables within the Holtzman Inkblot Technique. In general, the American child produced faster reaction times, used larger portions of the inkblots in giving his responses, gave more definite form to his responses, and was still able to integrate more parts of the inkblot while doing so. He used more color and ascribed more movement to his percepts than did the Mexican child. At the same time, his active fantasy life and attempts to deal with all aspects of the inkblots in an active manner produced a higher amount of deviant thinking and anxious and hostile content.

The current study reports only a few highlights of the much larger research program involving hundreds of children and their families in both Mexico and the United States. Additional studies currently in progress are aimed at gaining greater insight into the complex relationships between cognitive, perceptual and personality measures on the one hand and family life-style, home environment and school performance variables as these aspects of personality development change over time in the two cultures.

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